

### **REMARKS**

The Office Action mailed January 25, 2007 has been carefully considered.  
Reconsideration in view of the following remarks is respectfully requested.

#### **Abstract of the Invention**

The Abstract has been amended in accordance with the Examiner's suggestions, reducing the number of words therein to 150.

#### **Rejection(s) Under 35 U.S.C. § 112, First Paragraph**

Claims 10, 11, 12, 13, 20 and 21 were rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains or with which it is mostly nearly connected, to make and/or use the invention. Applicants respectfully traverse.

With respect to the “*simulated hand*” or “*second simulated hand and/or multi-articulated structure*,” attention is respectfully directed to for example FIG. 5 and the attendant discussion beginning on page 17, line 23, and to FIGS. 6A and 6B and the associated discussion beginning on page 19, line 5. These and other portions of the disclosure describe for example “two computer-simulated virtual hands,” one of which “is a graphical hand [602, FIG. 6B] which is rendered, and the other is a ‘ghost’ hand [600, FIG. 6A], which is not displayed, but given the measurements of the hand reproduces as precisely as possible the movements of the physical hand.”<sup>1</sup> (Emphasis added). The term “multi-articulated structure” is a generic term for a hand, a human figure (FIG. 9 and associated discussion, a generic mechanical structure (FIG. 10 and associated discussion) and “other body parts and graphical inanimate objects.”<sup>2</sup> The term “multi-articulated structure” is used for example in the Summary of the Invention (*see* page 5, ll. 8-9, and l. 22), and a multi-articulated spring model simulation is described as being used to model a hand, in page 19, ll. 19-20.

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<sup>1</sup> P. 17, ll. 25-28.

<sup>2</sup> P. 10, ll. 12-13.

With respect to “*using a simulated spring attached between first and second simulated hands, where the angles and placement, of said first simulated hand uses said digitized measured signals and the angles and placement of said second simulated hand uses said modified signals and said first and second simulated hands are superimposed in the absence of said second simulated hand encountering said simulated impediment,*” attention is directed to the Detailed Description of Embodiments of the Invention, wherein a portion of this process, and particularly the operation of the processor in connection with the processor, is described in some detail, for example in the paragraph bridging pages 10 and 11. Attention is also directed to the discussion of FIG. 7, and of FIG. 8 in particular. For example, FIG. 8D is described as showing “an embodiment where the simulated hand [that is, the graphical hand] is allowed to translate along an arbitrary vector to find the shortest tracker-spring distance (i.e., disparity) to the ghost hand, thus minimizing the total spring energy.” This and other passages, particularly as connected with FIGS. 7 and 8, relate to the relationship of the first and second hands vis-à-vis encountered impediments.

**Rejection(s) Under 35 U.S.C. § 103 (a)**

Claims 9, 14, 15, 16 and 22 were rejected under 35 U.S.C. § 103(a) as unpatentable over Massie (U.S. pat. no. 5,625,576). Applicants respectfully traverse. Claims 9, 14, 15, 16 and 22 relate to movement of a hand or, more generically, a multi-articulated structure. Details and limitations of Claims 9, 14, 15, 16 and 22 are specific to such a hand or multi-articulated structure. This is a fundamental difference between the present invention as claimed and Massie, which does not relate to a hand or multi-articulated structure and fails to disclose or suggest details relating to same. Rather, Massie tracks movements of a point, such as the end of a thumb, finger or stylus/pen (“What matters is the location of the pen tip.” Col. 25, ll. 27-28), and maps this point in a virtual environment which can display it as a reference point. The passage cited in the Office Action relating to “a graphical representation or abstraction of the user contact apparatus and its location relative to the virtual environment” (Massie, col. 23, ll. 27-33) is unclear, since the specific term “user contact apparatus” is not defined in Massie, and, if taken to mean the whole mechanical contraption depicted in for example FIGS 1-4, is not enabled and

accordingly fails to provide a proper basis for a 35 U.S.C. §103(a) obviousness rejection.<sup>3</sup> Thus contrary to the allegation in the Office Action, Massie fails to disclose “*a device for measuring the configuration of said physical multi-articulated structure*” (Claim 9, emphasis added), because, as the Office Action acknowledges and supports with source citation, the Massie device is merely intended to “keep track of the user’s position with respect to that freedom” (emphasis added). Massie is thus only concerned with the end point of the user’s thumb, finger, stylus or the like; Massie is not concerned with the configuration of the whole of the multi-articulated device and does not endeavor to depict the whole device in the virtual environment, despite the gratuitous mention of the “user contact apparatus” (Massie, col. 23, ll. 27-33). The various measurements taken by the references #550, 562, 570, 580, and so forth, mentioned in the Office Action are intended to relate the kinematics of the local point (thumb, finger, stylus) at the master location to the depiction of the non-local reference point in the virtual display at the slave location. They are not intended to map the configuration of a physical device to that of a virtual one. Applicant’s disclosure and emphasis are fully consistent with such a definition of “configuration,” rather than simple point mapping, as for example FIGS. 5, 6 and 7, which provide detailed representations of all the articulating joints and axes of the hand, show.

Moreover, Massie does not show a data processor which modifies digitized signals associated with the configuration and spatial placement of a physical multi-articulated structure to generate a set of modified signals specifying the configuration and spatial placement of a simulated multi-articulated structure such that when the simulated multi-articulated structure encounters a simulated impediment, the configuration and spatial placement of the simulated multi-articulated structure is in part determined by constraints causing the simulated multi-articulated structure to flex. As discussed above, “configuration” in the manner used in the present description, which is consistent with the ordinary and accustomed meaning of that term, is not a concern of Massie. Only the end point position, in the master environment and in the mapped slave environment, is of concern in Massie. Thus none of these claimed limitations are met by Massie.

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<sup>3</sup> “A reference contains an ‘enabling disclosure’ if the public was in possession of the claimed invention before the date of invention. ‘Such possession is effected if one of ordinary skill in the art could have combined the publication’s description of the invention with his [or her] own knowledge to make the claimed invention.’ MPEP §2121.01, citing *In re Donohue*, 766 F.2d 531, 226 USPQ 619 (Fed. Cir. 1985). ”

In addition, Massie fails to disclose flexure of the simulated multi-articulated structure based on constraint data of the simulated impediment and the simulated multi-articulated structure. In fact Massie fails to disclose any flexure, and certainly fails to disclose flexure of the configuration of the simulated multi-articulated structure. The allegation in the Office Action that “generating resisting force is functionally equivalent to “*flex*” (emphasis original) is untenable. An important aim of the invention, as articulated in first complete paragraph of page 9 of the written description, is to attempt to provide a realistic simulation of the interaction of a virtual object with a virtual hand (or multi-articulated structure), as that simulated is perceived a user manipulating a physical multi-articulated structure. When for example encountering a virtual doorknob or light switch, it is important to visually and haptically cue the user to the interaction, such that user feels the interaction, and also, importantly, sees the consequences of that interaction. The flexure of the displayed virtual multi-articulated structure provides just such indications, disencumbering the user of the burden of difficult depth dimension judgment. As stated above, Massie neither mentions nor addresses these issues, and is any case not equipped to do so because a single point, as Massie is exclusively concerned with, cannot flex and does not have a configuration.

Claims 10, 11, 12 and 13 were rejected under 35 U.S.C. § 103(a) as unpatentable over Massie (U.S. pat. no. 5,625,576) in view of Petrich (U.S. pat. no. 6,104,379). Applicants respectfully traverse. Petrich fails to remedy the shortcomings of Massie discussed above. These shortcomings are also applicable with regards Claims 10-13. Accordingly, Claims 10-13 are patentable over the combination of these references.

Claims 17-21 were rejected under 35 U.S.C. § 103(a) as unpatentable over Petrich (U.S. pat. no. 6,104,379). Applicants respectfully traverse. Claim 17 recites, *inter alia*, “a set of modified signals configured to deform the simulated multi-articulated structure when a simulated interaction occurs between the simulate multi-articulated structure and a simulated object.” This feature is not disclosed in or suggested by Petrich. In the column 6, lines 44-56 passage cited in the Office Action is a general description of a simulation environment including hand sensing joint-link devices worn by a user and a monitor for depicting a graphical representation of

corresponding hands. No discussion or suggestion of deformation of a simulated multi-articulated structure when a simulated interaction occurs between a simulate multi-articulated structure and a simulated object is provided. It will be recalled that according to the Manual of Patent Examining Procedure (M.P.E.P.),

To establish a *prima facie* case of obviousness, three basic criteria must be met. First there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in the applicant's disclosure.<sup>4</sup>

For this reason at least, an obviousness rejection of Claim 17, and Claims 18-21 dependent thereon, based on Petrich is improper and should be withdrawn.

### **Conclusion**

In view of the preceding discussion, Applicants respectfully urge that the claims of the present application define patentable subject matter and should be passed to allowance.

If the Examiner believes that a telephone call would help advance prosecution of the present invention, the Examiner is kindly invited to call the undersigned attorney at the number below.

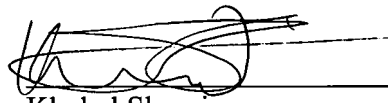
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<sup>4</sup> M.P.E.P § 2143.

Please charge any additional required fees, including those necessary to obtain extensions of time to render timely the filing of the instant Amendment and/or Reply to Office Action, or credit any overpayment not otherwise credited, to our deposit account no. 50-1698.

Respectfully submitted,  
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Dated: 05/25/2007



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